IN THE SPECIFICATION

Please replace the paragraph at page 3, line 21, with the following rewritten paragraph:

However, in the automobile mirror having a reversibly variable transmittance utilizing such electrochromic elements, a sensor, which can ~~sensitize~~ be sensitized by a relatively strong light such as sunshine and a light from a head light of next car, a control circuit which controls the actuation of the electrochromic elements based on a signal produced from the sensor and other device should be separately required, leading to a problem associated with complicated configuration.

Please replace three paragraphs at page 4, line 15, with the following rewritten paragraphs:

In the glazing utilizing the [[later]] latter material, the photochromic material absorbs a light [[at a]] in an ultraviolet region to thereby be reversibly isomerized, causing coloration or bleaching in a reversible manner. Typical examples of the organic pigments include compounds derived from spirooxazine and spiropyran.

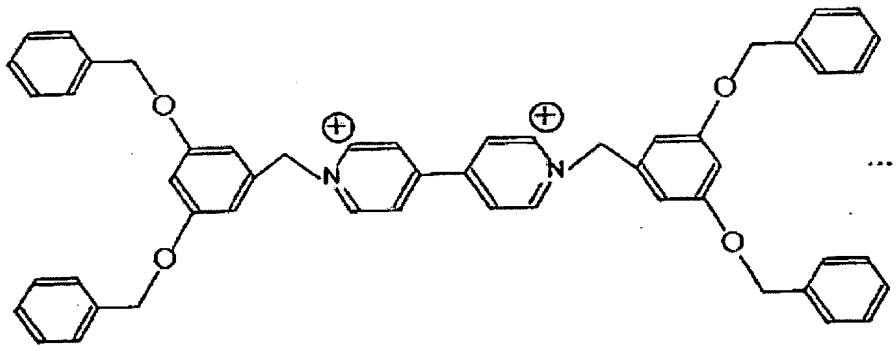
However, in the glazing utilizing the photochromic material described above, irradiation of ultraviolet light contained in sunshine is required for causing coloration and bleaching of the photochromic material in a reversible manner. For this reason, even if a light from a head light of an oncoming car enters into the glazing, it has been difficult to ~~colors~~ color the mirror enough for preventing a driver or such from dazing due to its weak strength of ultraviolet ~~possessed by~~ light in the automobile head light. Consequently, in such a case, a light source, which can irradiate [[with]] the photochromic materials with an [[a]]

ultraviolet light at a strength sufficient for reversibly changing coloration and bleaching, is required to be separately placed. This poses a problem in terms of insufficient practical use.

The present invention has been made in light of the above problems, and a first object of the present invention is to provide a photochromic material, which does not exhibit any photochromic property ~~against~~ in response to a light having a wavelength within a visible region and which ~~absorbs~~ is sensitized by a light having a given wavelength within a wavelength region of not less than 700 nm (particularly infrared region) and absorbs [[into]] a light in visible region, and to provide a functional element using such a phenomenon. Specifically, in the photochromic material and the photochromic phenomenon according to the present invention, since it ~~sensitizes~~ is sensitized by a light having a specific wavelength within a wavelength region of not less than 700 nm (particularly infrared region) to exhibit a photochromic property, a light having a wavelength in ultraviolet ~~wavelength~~ region is not required for the ~~exhibition of a~~ photochromic property.

Please replace seven paragraphs at page 6, line 1, with the following rewritten paragraphs:

As a result, it has been clarified that when a light (such as a xenon light source) having ~~a prescribed energy at~~ a specific wavelength (for example, 830 nm) within an infrared region of not less than 750 nm is irradiated to 4,4'-bipyridine derivative represented by the following formula (1):



... (1)

the absorbance of the 4,4'-bipyridine derivative at approximately 610 nm as a center is increased and the 4,4'-bipyridine derivative is blue-colored, while it becomes gradually a transparent color, when the irradiation of the above-mentioned light is stopped or [[(]]the derivative is placed in a dark place ~~portion to decrease the light absorbency thereof~~.

It is noted that the conventional photochromic compound is required to be irradiated with a light having a wavelength in ultraviolet light region of from 380 nm to 400 nm to exhibit its photochromic phenomenon ~~as a rule~~.

With regard to compound ~~analogue~~ analogous to the 4,4'-bipyridine derivative represented by the formula (1) described above (derivatives in which a benzene ring at the terminal of the dendrimer construction adducted to the 4,4'-bipyridine is substituted with other substituent (e.g., naphthalene)), Ghaddar et al., of North ~~Carolinian~~ Carolina State University ~~have been~~ reported the change in the absorbance of various 4,4'-bipyridine derivatives at a wavelength of 600 nm, which is within a visible light region, excited by [[a]] an ultraviolet light having a wavelength of 266 nm (Journal of American Chemical Society, 2002, 124, P8285-8289). However, this report shows the photochromic property within [[a]] an ultraviolet light region, and does not show any photochromic property ~~against~~ upon irradiation of a light having a wavelength ~~region~~ of not less than 700 nm (especially infrared region). Also, this report does not disclose the 4,4'-bipyridine derivative represented by the

formula (1) described above, (derivatives whose the terminal of the dendrimer construction adducted to the 4,4'-bipyridine is a benzene ring).

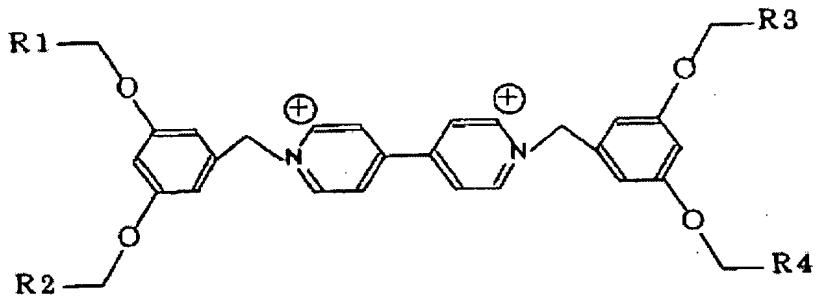
In contrast, we have clarified for the first time that the 4,4'-bipyridine derivative represented by the formula (1) ~~sensitizes~~ can be sensitized by a light having a specific wavelength [[of an]] in infrared region to exhibit a photochromic phenomenon. Also, by ~~the use of~~ employing the 4,4'-bipyridine derivative having such a characteristic, a photochromic display element ~~has newly realized,~~ which ~~sensitizes~~ exhibits a blue color upon being sensitized by a light having a specific wavelength [[of an]] in infrared region can be realized. Such a light is contained in a head light utilizing a white and bright xenon light source, which [[has]] recently appeared and [[which]] has been used in a part of an automobile~~, to exhibit a blue color~~. It has been found that a functional element utilizing a photochromic phenomenon that ~~sensitizes~~ is triggered by a light having a wavelength of not less than 700 nm or specific wavelength within [[a]] infrared region and exhibits absorption in [[a]] visible ~~wavelength~~ region can be realized~~, resulting in the present invention~~.

Such a phenomenon, that is to say, a colored state ~~and bleached state are reversibly~~ exhibited [[by]] upon irradiation of a light having a specific wavelength within [[an]] infrared region and reversed to a bleached state when non-irradiation, is ~~considered to bring about~~ thought to be caused by a photochemical reaction of the 4,4'-bipyridine derivative represented by the formula (1) where at the time of coloration, it is reduced [[to be]] and colored and at the time of bleaching, it is in a stable ~~construction~~ form due to the reversible reaction.

It has been clarified that ~~the photochromic material, which attain these and other objects of the present invention may be made up of any of~~ substances having a ~~construction~~ structure or properties ~~analogies~~ analogous to that of the 4,4'-bipyridine derivative (biologen

derivative) represented by the formula (1) may attain the foregoing and other objects according to the present invention. It has also been clarified that depending upon ~~the construction or such~~ structure, [[these]] substances ~~each sensitizes~~ can be sensitized by a light having ~~a prescribed energy at~~ a specific wavelength of not less than 700 nm, while not being [[not]] restricted to an infrared region of not less than 750 nm, to exhibit a photochromic phenomenon.

For example, a 4,4'-bipyridine derivative represented by the following formula (2) in which the terminal benzene ring of the dendrimer ~~construction~~ structure adducted to 4,4'-bipyridine is substituted with other condensed ring (such as naphthalene) falls under the photochromic material according to the present invention .



... (2)

wherein R_1, R_2, R_3, and R_4 may be the same or different from each other and each is a condensed aromatic hydrocarbon or a derivative thereof.

Please replace the paragraph at page 9, line 5, with the following rewritten paragraph:

The photochromic composition according to the present invention comprises a solution having the photochromic compound according to the present invention dissolved in one solvent or a mixed solvent selected from [[among]] dimethylformamide (DMF), dimethylacetamide, propylene carbonate, acetonitrile, gamma-butyllactone, and butanol.

Please replace eleven paragraphs at page 9, line 13, with the following rewritten paragraphs:

In [[By]] such a ~~configuration~~ form, a photochromic composition having the photochromic compound ~~according to the present invention~~ dispersed in a prescribed solvent or a polymer film ~~having the photochromic compound according to the present invention dispersed therein may be composed, which~~ makes it easy to realize various functional elements ~~applied to the photochromic compound according to the present invention~~ such as display elements. What is more, the use of the photochromic compound according to the present invention meets a production of functional elements satisfying various needs including its function, its performance, and a cost.

It is noted that the photochromic film according to the present invention may be formed, for example, by ~~a process comprising~~ adding PVP (polyvinyl pyrolidone), polymethyl metacrylate (PMMA) or such to be thicken, followed by film formation. Also, it can be formed by ~~a process comprising~~ adding the photochromic compound ~~according to the present invention~~ to a composition [[whose]] containing monomer ~~component is~~ which is polymerizable by vinyl-addition polymerization, ring-opening addition polymerization or a combination thereof (such as epoxy, acrylic and urethane monomers), followed by polymerization. Furthermore, it can be formed by the addition of the photochromic compound according to the present invention, utilizing any of the known resin formation techniques such as ultraviolet curing and thermal curing. It should be noted that ~~kinds of the~~ polymers making up a matrix for ~~compounding~~ the photochromic compound according to the present invention are not specifically restricted, [[and]] but various polymers are applicable as long as they can highly disperse the photochromic compound according to the present invention and ~~they are~~ chemically stable.

As described above, the functional element according to the present invention ~~comprises~~ has a photochromic layer which ~~sensitizes~~ can be sensitized by a light having a wavelength of not less than 700 nm or a specific wavelength within [[an]] infrared region, and which exhibits absorbance within [[a]] visible region, and a light source which [[has]] provides an energy ~~strength at~~ in a wavelength region of not less than 700 nm or a specific wavelength within [[an]] infrared region enough for ~~being sensitized by~~ sensitizing the photochromic compound, ~~wherein~~ utilizing a photochromic phenomenon~~, which sensitizes~~ triggered by a light having a wavelength of not less than 700 nm or a specific wavelength within [[an]] infrared region, and ~~which exhibits~~ exhibiting absorbance within [[a]] visible region~~, is utilized~~.

The functional element constructed as described above basically possesses an effect that it ~~sensitizes~~ is sensitized by a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm, particularly [[at]] a specific wavelength within [[an]] infrared region of not less than 750, nm to exhibit a photochromic phenomenon. Specifically, a photochromic display element ~~can be realized,~~ which reversibly brings out coloration within a visible light region ~~and bleaching by~~ upon irradiation of a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm, particularly [[at]] a specific wavelength within [[an]] infrared region of not less than 750 nm.

The functional element according to the present invention may be constructed to possess [[a]] an ultraviolet shielding member, which ~~shield~~ shields an incident ultraviolet light entering [[in]] into the functional element.

In the functional element constructed as described above, since a member for shielding an ultraviolet light is provided at a side where a light enters [[in]] into the

photochromic layer, the deterioration of the photochromic layer due to [[a]] an ultraviolet light can be prevented.

Also, since a member for shielding an ultraviolet light is provided at a side where a light enters [[in]] into the photochromic layer, ~~even if the~~ a photochromic layer is prevented from exhibiting its photochromic phenomenon, even if it is capable of being sensitized by ~~to sensitize~~ a light within [[a]] ultraviolet region ~~to exhibit a photochromic phenomenon (for example, in the case where the layer is composed of the photochromic compound represented by the formula (1)), the photochromic phenomenon exhibited by being sensitized to a light within a ultraviolet region can be avoided~~.

The functional element according to the present invention may be constructed such that the photochromic layer containing the photochromic compound ~~at least~~ contains [[a]] an ultraviolet absorber, which absorbs [[a]] an ultraviolet light.

Similarly, the photochromic composition and the photochromic film according to the present invention may also have ~~a construction at least comprising the photochromic compound and a~~ such an ultraviolet absorber~~, which absorbs a ultraviolet light~~.

In the functional element, [[the]] photochromic composition, and [[the]] photochromic film above ~~according to the present invention~~, the deterioration of the photochromic layer due to [[a]] an ultraviolet light can be prevented.

~~Also, even if the photochromic layer is to sensitize a light within a ultraviolet region to exhibit a photochromic phenomenon (for example, in the case where the layer is composed of the photochromic compound represented by the formula (1)), the photochromic phenomenon exhibited by being sensitized to a light within a ultraviolet region can be avoided by the ultraviolet absorber.~~

Please replace three paragraphs at page 12, line 16, with the following rewritten paragraphs:

As the display elements utilizing an emitter, various industrial products such as automobile meters, and display portions of cellular phones have been put into practical use. ~~In these display element, when~~ Using a light source (such as a xenon light source) having ~~a prescribed energy at~~ a specific wavelength ~~region~~ within a wavelength region of not less than 700 nm ~~is used as a light source, and when the~~ and photochromic materials ~~according to the present invention,~~ which can be ~~sensitive to the~~ sensitized by such a light source, ~~is used,~~ a display element can be made with no complicated control circuit. Also, [[the]] such a display element according to the present invention can be jointly used as a dimming element together with any of the conventional techniques.

Another ~~Especially, as in the display element, another~~ example of the functional element includes an anti-glare mirror.

Being applied to an automobile mirror, the present invention can solve the problem ~~in terms~~ of complicated configuration due to control circuits for controlling the actuation of an electrochromic element~~, and the like as~~ in ~~an anti-glare mirror utilizing~~ the conventional electrochromic element. Also, in the present invention, there is no need for separately providing a light source for irradiating [[a]] an ultraviolet light in order to exhibit a photochromic phenomenon as in the conventional anti-glare mirror utilizing a photochromic material. Consequently, an anti-glare mirror~~, which can solely realize an anti-glare function~~ without any sensor and control circuit can be provided, ~~having~~ making it extremely [[high]] practical application.

Please replace five paragraphs at page 14, line 23, with the following rewritten paragraphs:

The transparent substrate 12 at the front surface side and the substrate 14 at the rear surface side are both made of glass. The photochromic layer 13 is composed, for example, of a photochromic compound represented by the formula (1). At a front surface side of the transparent substrate 12 at the front surface side, [[a]] an ultraviolet light shielding member 15 for shielding [[a]] an ultraviolet light is provided.

The present invention is not specifically restricted to the substrates making up the substrate 12 and the substrate 14, respectively, but any of the conventional transparent substrates and substrates can be applied as long as they have a transparency and/or strength required in the present invention. For example, glass such as a soda lime glass and a transparent resin such as an acrylic plate may be used. Also, in the present invention, the ultraviolet light shielding member 15 is not specifically restricted, and any of the conventional ultraviolet light shielding members is applicable as long as they can prevent the photochromic compound according to the present invention from being deteriorated through [[a]] an ultraviolet light. For example, [[a]] an ultraviolet cutting film may be applied to the transparent substrate 12 via an adhesive. Also, a thin film for shielding [[a]] an ultraviolet light may be formed onto the transparent substrate 12 by any of various methods. Alternatively, the transparent substrate 12 itself may be made of ultraviolet absorbing glass or colored glass.

The photochromic element 1 according to the first embodiment of the present invention constructed as described above basically possesses an effect that it ~~sensitizes~~ is sensitized by a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm or a specific wavelength within [[an]] infrared

region to exhibit a photochromic phenomenon. Specifically, a photochromic display element ~~can be realized,~~ which reversibly brings out coloration within a visible light region ~~and bleaching by~~ upon irradiation of a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm or a specific wavelength within [[an]] infrared region can be realized.

In the functional element constructed as described above, since a member for shielding an ultraviolet light is provided at a side where a light enters [[in]] into the photochromic layer, the deterioration of the photochromic layer due to [[a]] an ultraviolet light can be prevented.

Also, since a member for shielding an ultraviolet light is provided at a side where a light enters [[in]] into the photochromic layer, ~~even if~~ the photochromic layer is prevented from exhibiting its photochromic phenomenon even if it is capable of being sensitized by ~~to sensitize~~ a light within [[a]] an ultraviolet region ~~to exhibit a photochromic phenomenon (for example, in the case where the layer is composed of the photochromic compound represented by the formula (1)), the photochromic phenomenon exhibited by being sensitized to a light within a ultraviolet region can be avoided~~.

Please replace the paragraph at page 16, line 19, with the following rewritten paragraph:

In such a configuration, a mirror ~~serving as~~ having the photochromic function ~~of the photochromic element~~ can be realized. This configuration is ~~suitably~~ suitable for an automobile anti-glare mirror.

Please replace four paragraphs at page 17, line 22, with the following rewritten paragraphs:

The transparent substrate 22 at the front surface side and the substrate 24 at the rear surface side are both made of glass. The photochromic layer 23 is composed, for example, of a photochromic compound represented by the formula (1). An ultraviolet absorber, which absorbs [[a]] an ultraviolet light, is ~~compounded~~ included in the photochromic layer 23.

The ultraviolet absorber [[to]] which can be used in the present invention are not specifically restricted, and various ultraviolet absorbers known in the art may be applied as long as they can prevent the photochromic compound according to the present invention from being deteriorated. In the present invention, for example, a benzophenone type ultraviolet absorber (2,4-dihydroxybenzophenone) or such commercially available from Sumitomo Chemicals Co., Ltd., Dainippon Ink and Chemicals Inc., or Dow Chemicals Inc. may be ~~compounded in~~ added to a photochromic solution making up the photochromic layer or a polymer film containing the photochromic compound, after confirming that the ultraviolet absorber ~~to be used~~ can be [[well]] dissolved in a solvent composition well.

The photochromic element 2 according to the first embodiment of the present invention constructed as described above basically possesses an effect that it ~~sensitizes~~ is sensitized by a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm or a specific wavelength within [[an]] infrared region to exhibit a photochromic phenomenon. Specifically, a photochromic display element ~~can be realized,~~ which reversibly brings out coloration within a visible light region ~~and bleaching by~~ upon irradiation of a light (for example, a xenon light source) having ~~a prescribed energy at~~ a wavelength ~~region~~ of not less than 700 nm or a specific wavelength within [[an]] infrared region can be realized.

The ultraviolet absorber in the photochromic element 2 can prevent the photochromic layer or the composition from being deteriorated through an ultraviolet light.

Also, even if the photochromic layer is ~~to sensitize~~ capable of being sensitized by a light within [[a]] ultraviolet region to exhibit a photochromic phenomenon (for example, in the case where the layer is composed of the photochromic compound represented by the formula (1)), ~~the photochromic phenomenon exhibited by being sensitized to a light within a ultraviolet region can be avoided by means of~~ the ultraviolet absorber prevents the photochromic layer from being sensitized by such a light, thus not exhibiting the photochromic phenomenon.

Please replace two paragraphs at page 19, line 9, with the following rewritten paragraphs:

In such a configuration, a mirror ~~serving as~~ having the photochromic function ~~of the photochromic element~~ can be realized. This configuration is ~~suitably~~ suitable for an automobile anti-glare mirror.

For example, as shown in FIG. 3 (third embodiment), a photochromic display element 3 may be composed of a transparent substrate 32 placed on a front surface side, and a light reflective film 35 placed on a front surface side of a substrate 34 between which a photochromic layer 33, which contains a photochromic compound and which exhibits a photochromic phenomenon, is intervened. The photochromic layer 33 has [[a]] an ultraviolet absorber which absorbs [[a]] an ultraviolet light ~~compounded~~ included therein. This configuration is suitable [[as]] for an automobile anti-glare mirror.

Please replace two paragraphs at page 19, line 22, with the following rewritten paragraphs:

In such a configuration, a mirror having the photochromic function ~~of the photochromic display element~~ can also be realized.

For example, as shown in FIG. 4 (fourth embodiment), a photochromic display element 4 may be composed of a transparent substrate 42 placed on a front surface side, and a light-reflective substrate 45 placed on a rear surface side between which a photochromic layer 43, which contains a photochromic compound and which exhibits a photochromic phenomenon, is intervened. The photochromic layer 43 has [[a]] an ultraviolet absorber which absorbs [[a]] an ultraviolet light compounded therein. This configuration is suitable [[as]] for an automobile anti-glare mirror.

Please replace the paragraph at page 21, line 2, with the following rewritten paragraph:

To a solution of a compound shown in FIG. 5 (1) [3,5-dibenzyloxybenzyl bromide, alias: 3,5-bis(benzyloxy)benzyl bromide] in dry acetonitrile, a solution of a compound shown in FIG. 5 (2) [4,4'-bipyridine, alias: 4,4'-bipyridyl]] in dry acetonitrile was added dropwise under a reflux condition over a period of ~~several ten~~ tens of minutes, and the mixture was refluxed over a period of several days. After the reaction was completed, the solution was allowed to cool down to a room temperature. This gave a yellow crystal. This was washed with acetonitorile and with ether and recrystallized from methanol to obtain 4,4'-bipyridine derivative represented by the formula (1).

Please replace three paragraphs at page 21, line 16, with the following rewritten paragraphs:

Subsequently, the solution [[od]] of 4,4'-bipyridine derivative in DMF was applied to a soda lime glass, dried in vacuo at 60°C to obtain an approximately 0.1 mm thick film. This film was then sandwiched [[bween]] between ultraviolet light shielding films (UV cutting films available from Achilles Co., Ltd. under a trade name of Achilles Vinylus), irradiated with a light from a xenon lamp having spectral characteristics shown in FIG. 6, and was measured for ~~distribution of~~ absorbance before and after the irradiation. As a result, the absorbance of the film containing the 4,4'-bipyridine derivative was changed as shown in FIG. 7.

As shown in FIG. 6, this xenon lamp has a peak of emission spectrum (bright line spectrum of xenon) at approximately 830 nm, which is within a ~~wavelength~~ region of not less than 700 nm and within [[an]] infrared region.

As shown in FIG. 7, it can be understood that in the film containing the 4,4'-bipyridine derivative, the absorbance is instantly increased at a peak of approximately 610 nm ~~as a center~~ upon the irradiation with a light of the xenon lamp. Also, it can be understood that as the time elapse after stopping the irradiation ~~with a light of the xenon lamp is increased~~ increases from 5 minutes, to 20 minutes, to 30 minutes, and to 90 minutes, the absorbency at the peak of approximately 610 nm ~~as a center~~ is gradually decreased, and is returned to be its original state.

As described above, the 4,4'-bipyridine derivative ~~sensitizes~~ is sensitized by a light containing an infrared light of 830 nm whereby increasing the absorbance at approximately 610 nm ~~as a center, which is~~ within a visible light region~~, is increased~~ and turning the derivative ~~to have a~~ blue [[color]]. In addition, when the irradiation with a light containing

the infrared light is stopped (or the derivative is placed in a dark ~~portion~~), the derivative becomes colorless. Accordingly, the derivative has been found to exhibit [[a]] the photochromic phenomenon, i.e., ~~in which~~ a colored state of a blue color and colorless bleached state [[are]] reversibly take place ~~brought about~~.